CHAPTER 10

CANCER REPORT

Germaine Wong
Kirsten Howard
Jonathan Craig
Stephen McDonald
Jeremy Chapman

INTRODUCTION

RISK OF CANCERS IN KIDNEY DISEASES

Notification of malignant cancers is a voluntary process through the ANZDATA Registry, but it is a statutory requirement for the state cancer registries mandated by State laws. In the 2005 ANZDATA Cancer report, the validity and accuracies of the ANZDATA registry were assessed by a comparison of cancer records held by ANZDATA and those by the Central Cancer Registry of NSW through data linkage of the two dataset[1]. The overall agreement between the two registries was over 77%. A substantial amount of the mis-clarification arose from lip cancers which were counted in cancer registries but not ANZDATA. A similar linkage project has now also been performed between cancer data from the ANZDATA Registry and all state cancer registries in Australia and New Zealand and a paper is now published in JAMA, 2006 296, 2823-2831. It is mandatory for all state cancer registries to report to the National cancer statistics clearing house, which collates cancer data for the Australian Institute of Health and Welfare (AIHW). According to these analyses, cancer risk was increased both the Australian and New Zealand dialysis and renal transplant population. The overall standardised relative risk for all cancer is 1.35 [95% CI 1.27-1.45] and 3.27 [95% CI 3.09-3.46] for the dialysis and transplant population respectively. Key information regarding risks is appended to this chapter (Figures 10.2 -10.4)

Cancer survival by stage and the overall survival are also much worse than the general population. Previous ANZDATA reports have shown that the overall median cancer survival is only 2.2 years in the Australian and New Zealand renal transplant population. The ability to quantify the adjusted cancer risk profile and overall cancer survival is imperative to future implementation of post-transplantation and dialysis monitoring guidelines and management.

ECONOMIC EVALULATION OF FOBT COLORECTAL CANCER SCREENING IN RENAL TRANSPLANT POPULATION

The main ways to improve cancer-related mortality and morbidity include prevention of cancer, early detection and effective treatment. Much effort has been expended on understanding avoidable risk factors for the development of cancer after transplantation. Relatively little thought has been given to early detection through screening. In this report, we have evaluated the costs and benefits of colorectal cancer screening in the renal transplant population. Colorectal cancer is the second leading cause of cancer-related mortality in the general population. Colorectal cancer screening using annual and biennial FOBT screening has been shown to be cost-effective when compared to no screening in the general population. The incremental cost-effectiveness ratio is $10,000-20,000 per life year saved (LYS) [3-5].

Colorectal cancer is the second most common solid organ cancer in the Australian renal transplant population. The average risk of colon cancer in the transplant population is almost 2.5 times than the general population, although the relative risk for rectal cancer appears lower. A Markov model has been developed to simulate the different stages of colorectal cancer progression in a cohort of 1000 renal transplant recipients between the ages 50 to 70. The model compares a cohort who undergo annual FOBT colorectal cancer screening to a cohort who does not. In the screening group, colorectal cancers may be diagnosed with FOBT or clinical diagnosis. In the no screening group, colorectal cancer can only be diagnosed clinically. All persons with positive FOBTs or a clinical suspicion of colorectal cancer are followed by total colonic examination using diagnostic colonoscopies. Transplant recipients with colorectal cancer but not diagnosed clinically or through screening, will either survive or die with the disease undiagnosed in that year, the mode terminating when all individuals are deceased.

Prevalence and survival data of colon cancer are obtained from ANZDATA 1995-2005[1]. The model outcomes include: average costs and benefits of colorectal cancers screening, the number of deaths averted and the incremental cost-effectiveness ratios of screening compared to no screening. Assuming the baseline participation rate of 70%, the total average cost to screen one transplant recipient if $4,106; 10 colorectal cancer deaths would be averted in the screened population, with a cancer-specific mortality reduction of 35%. The estimated incremental cost-effectiveness of annual FOBT screening in the renal transplant population compared to no screening is $4,786/LYS if screening occurs between 50-70 years, $5,915/LYS between 45-70 years and $9,426/LYS between 35-70 years.

A sensitivity analysis is shown in Figure 10.1. The major variables that affect the cost-effectiveness ratios are the prevalence of diseases, probability of clinical diagnosis, test specificities and the overall participation rate of the screening program.

We have thus shown that colorectal cancer screening using immunochemical FOBT would be cost-effective in the renal transplant population. The incremental cost-effectiveness ratio of $4,786 per life year saved compares favourably to most cost-effective analyses of colorectal cancer screening in the general population.[3,4,6,7]

The current recommended starting age is 50 in the general population[8] since the benefits of starting screening at a younger age were small and costly when compare to starting at 50. This assumption cannot be applied to the transplant population. In contrast to the general population, data from the ANZDATA Registry shows that younger age groups incur greater relative risks. The risk of colorectal cancer in females younger than 35 years is 13.5 times the general population compared to 2.26 times in women older than 55. Our analysis shows that CRC screening using FOBT is still cost-effective at these earlier ages in the renal transplant population. This analysis is also robust when we tested the outcomes and costs in sensitivity analyses. (Figure 10.1).

Conclusion

This report highlights the overall cancer risks and the importance of early detection in the transplant population. Despite the increased cancer risks, no studies have looked at the costs and benefits of cancer screening in this population. This study is the first to explore this area of uncertainty. Our findings suggest that colorectal cancer screening in the transplant population might be cost-effective. Primary research looking into the effectiveness of screening, treatment and monitoring in this population could help clarify the imprecision in the model estimates.

Figure 10.1

One-Way Sensitivity Analyses
(Parameters Estimates that are Influential on the Model)

Variables	Range Being Tested	ICER Cost/LYS
Disease prevalence*	0.500	11312
	0.875	5713
	1.250	3494
	1.625	2312
	2.00	1583
Specificity	0.940	5867
	0.950	4515
	0.970	3165
	0.980	1817
	0.990	469
Participation rate	0.450	2155
	0.588	3637
	0.725	5033
	0.863	6351
	1.00	7597
Probability of clinical diagnosis	0.500	6620
	0.600	5666
	0.700	4786
	0.800	3970
	0.900	3213

**Disease prevalence = varies between 0.5 to 2 times than the point estimate*

The risk of cancer in Australian ESKD patients, 1982-2003, prior to renal replacement therapy, during dialysis and after transplantation is shown in Figure 10.2.

SIR=standardised incidence ratio, adjusted for age, gender, year of cancer and state of occurrence.

Figure 10.2

Site (ICD Code(s)*)	Up to 5 Years Prior to RRT		During Dialysis		After Transplantation	
	SIR	95% C.I.	SIR	95% C.I.	SIR	95% C.I.
All cancers (C00-C96 excl. C44, C64-C68,	1.16	1.08 - 1.25	1.35	1.27 - 1.45	3.27	3.09 - 3.46
Lip (C00)	1.87	1.17 - 2.83	3.68	2.46 - 5.28	47.08	41.75 - 52.89
Tongue (C01-C02)	0.53	0.06 - 1.93	3.28	1.69 - 5.72	7.17	4.38 - 11.07
Mouth (C03-C06)	1.34	0.43 - 3.13	2.15	0.98 - 4.08	4.58	2.51 - 7.69
Salivary gland (C07-C08)	2.11	0.57 - 5.40	1.20	0.15 - 4.34	7.71	3.33 - 12.20
Oesophagus (C15)	1.05	0.28 - 2.68	1.68	0.96 - 2.74	3.82	2.26 - 6.03
Stomach (C16)	0.81	0.35 - 1.60	1.52	1.01 - 2.19	1.84	1.07 - 2.94
Small intestine (C17)	1.25	0.15 - 4.53	3.06	1.12 - 6.67	1.73	0.21 - 6.25
Colon (C18)	1.33	1.06 - 1.65	1.18	0.93 - 1.47	2.36	1.87 - 2.92
Rectum (C19-C20)	1.33	0.98 - 1.77	1.02	0.72 - 1.40	0.63	0.33 - 1.07
Anus (C21)	0.33	0.07 - 0.96	0.23	0.03 - 0.82	2.76	1.51 - 4.64
Liver (C22)	2.87	0.78 - 7.34	2.25	1.23 - 3.77	3.19	1.53 - 5.87
Gallbladder (C23-C24)	0.00	-	1.55	0.67 - 3.05	4.34	2.16 - 7.76
Pancreas (C25)	2.16	0.87 - 4.45	1.17	0.69 - 1.85	1.21	0.56 - 2.30
Larynx (C32)	0.96	0.42 - 1.90	1.02	0.41 - 2.11	2.10	0.96 - 3.98
Trachea; bronchus and lung (C33-C34)	1.07	0.74 - 1.49	1.59	1.33 - 1.88	2.45	2.00 - 2.97
Melanoma (C43)	1.02	0.81 - 1.27	1.06	0.81 - 1.38	2.53	2.08 - 3.05
Mesothelioma (C45)	0.61	0.02 - 3.37	1.73	0.75 - 3.40	1.32	0.27 - 3.85
Kaposi sarcoma (C46)	19.64	4.05 - 57.40	57.88	21.24 - 125.98	207.90	113.66 -348.82
Connective and other soft tissue (C47-C49)	0.49	0.06 - 1.78	1.26	0.41 - 2.93	4.13	2.13 - 7.21
Breast (C50) (incl. males)	0.91	0.71 - 1.14	1.25	0.99 - 1.55	1.03	0.78 - 1.34
Vulva (C51)	1.57	0.19 - 5.67	1.59	0.19 - 5.73	24.54	14.55 - 38.79
Cervix uteri (C53)	1.60	0.80 - 2.86	2.58	1.38 - 4.42	2.49	1.33 - 4.27
Corpus uteri (C54)	1.53	0.92 - 2.40	1.07	0.53 - 1.91	1.74	0.92 - 2.97
Ovary (C56)	0.78	0.25 - 1.82	1.00	0.43 - 1.98	1.15	0.46 - 2.38
Penis (C60)	1.29	0.03 - 7.16	4.72	0.97 - 13.80	15.94	5.85 - 34.69
Prostate (C61)	1.16	0.98 - 1.36	0.66	0.52 - 0.83	0.95	0.68 - 1.29
Testis (C62)	2.10	0.77 - 4.57	0.71	0.02 - 3.94	1.25	0.34 - 3.20
Eye (C69)	2.10	0.68 - 4.91	1.22	0.15 - 4.39	7.57	3.46 - 14.36
Brain (C71)	0.19	0.00 - 1.07	1.10	0.59 - 2.05	0.57	0.16 - 1.46
Thyroid (C73)	2.57	1.44 - 4.24	9.23	6.53 - 12.67	6.90	4.69 - 9.79
Hodgkin disease (C81)	1.28	0.26 - 3.75	2.56	0.70 - 6.54	3.75	1.51 - 7.73
Non-Hodgkin lymphoma (C82-C85)	1.51	1.05 - 2.10	1.36	0.94 - 1.90	9.86	8.37 - 11.54
Leukaemia (C91-C95)	0.89	0.51 - 1.44	1.14	0.74 - 1.77	2.46	1.65 - 3.67
Unspecified primary site (C76-C80, C26, C39)	1.32	0.66 - 2.36	2.71	2.12 - 3.40	5.79	4.55 - 7.25

[1]International Classification of Diseases, 10th Revision (WHO 1992). [2]Excluding sites known to frequently cause ESKD (myeloma, kidney and renal tract) and only sites with a total of 10 or more cases. [3] The expected numbers of cancers prior to RRT were adjusted by site-specific survival. [4] The observed number of cases. [5]The expected numbers of Kaposi sarcoma cases were based on 1982 population rates.

More detailed tables available at http://web.med.unsw.edu.au/nchecr/Downloads/ SuptablesVajdicMA06_296.pdf

Risk of cancers post transplantation is shown in Figure 10.3

Figure 10.3

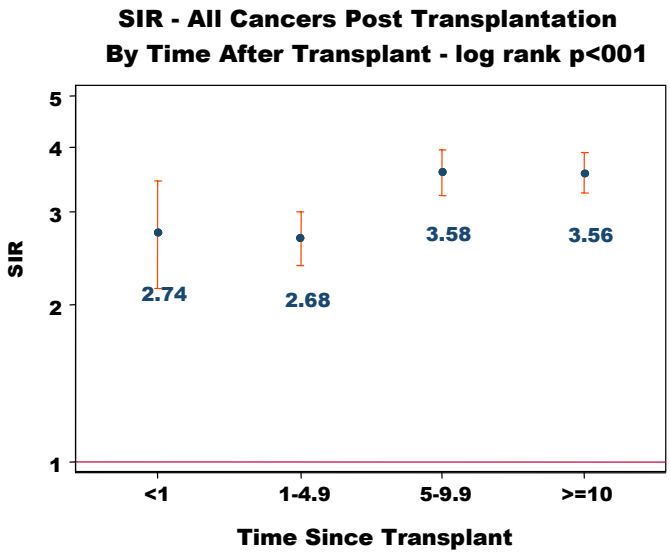
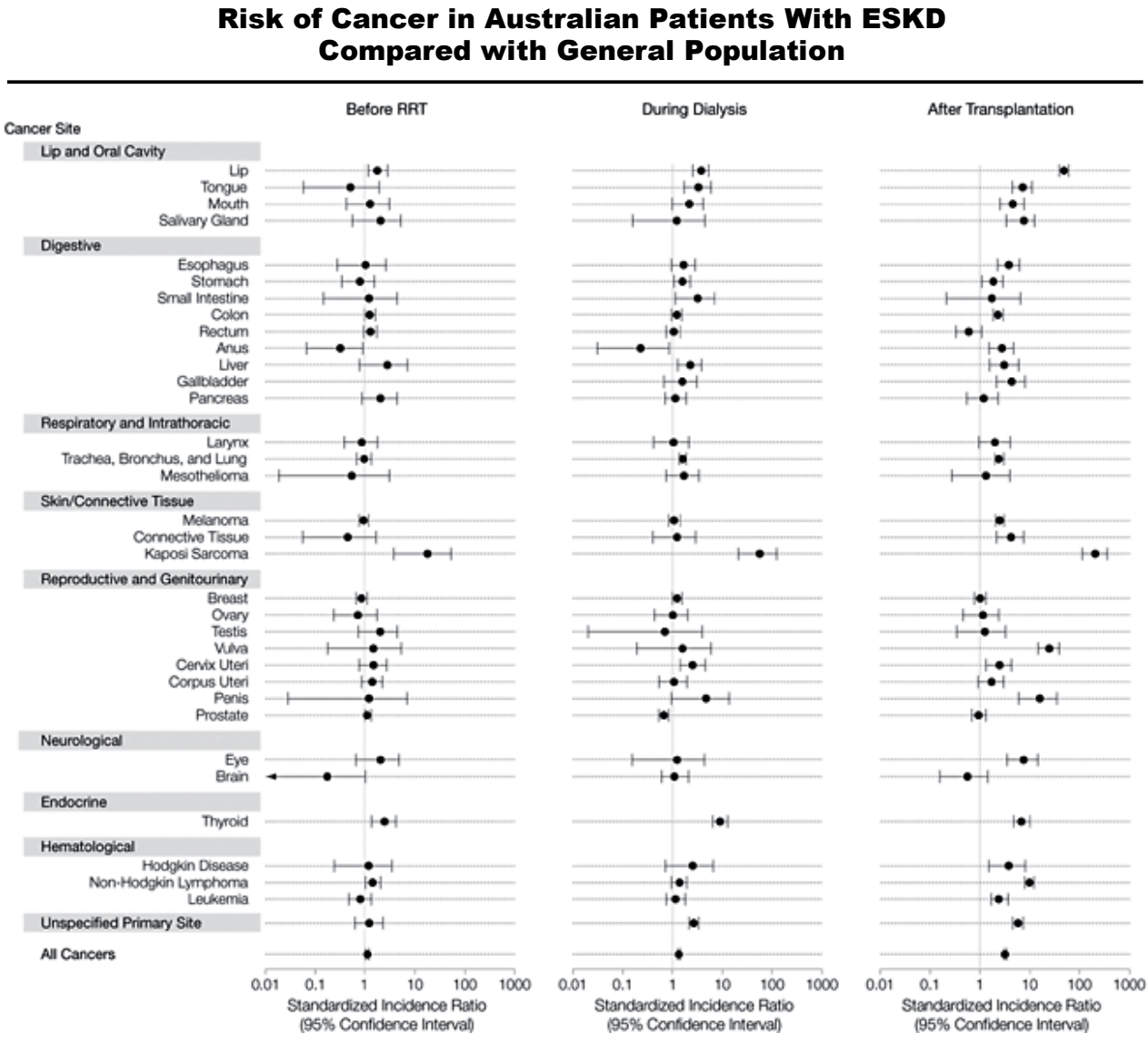


Figure 10.4



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